DETAILED ACTION

1. This is the fourth Office action on the merits of Application No. 10/505,382, filed on 20 August 2004. Claims 1-20 are pending.

Documents

2. The following documents have been received and filed as part of the patent application:

- Priority Document, received on 08/20/04
- Information Disclosure Statement, received on 08/20/04
- Appeal Brief, received on 06/25/07

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1, 2, 5-10, 16 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent No. 6,151,978 to Huber (Huber'978) in view of the 1999 Publication of Basic Rotational Quantities (BRQ'1999).

Note:

It should be noticed that ***Huber'978***, column 3, lines 27-31, states, "This invention preferably includes the method that is disclosed in the copending U.S. patent application Ser. No. 08/988,465, which was filed on Dec. 10, 1997. The teachings of that

application are incorporated into this specification by reference." The U.S. patent application Ser. No. 08/988,465, filed on Dec. 10, 1997, is now the U. S. Patent No. 6,167,996 to Huber et al. (Huber'996).

Claims 1, 2, 5-10, 16 and 17:

Huber'978 (Fig. 1; column 1, line 67 – column 6, line 4) discloses a driveline comprising:

- A first driveline portion (Huber'978, Fig. 1, being the combination of elements 12, 16 and a first portion of 18);
- A second driveline portion (Huber'978, Fig. 1, being the combination of elements a second portion of element 18, 20, 14 and 24);
- A first sensor (Huber'978, Fig. 1, element 40) operable to detect the speed information of the first portion of the driveline;
- A second sensor (Huber'978, Fig. 1, element 42 or the inherent vehicle speed sensor) operable to detect the speed information of the second portion of the driveline;
- Wherein the second speed sensor (being the inherent vehicle speed sensor) is operable to detect a speed of the vehicle;
- An engine (Huber'978, Fig. 1, element 12) inherently having a flywheel;
- A gearbox (Huber'978, Fig. 1, element 14);
- A control unit (Huber'978, Fig. 1, being combination of elements 32 and 34) operable to store at least one measured value which is related to the speed information between the first driveline portion and the second driveline portion

when the gear is engaged in the gearbox, and is operable to initiate a control action so that the reference/preselected speed and a prevailing speed between the first portion and the second portion are substantially equalized before the gear is disengaged (i.e., column 2, line 56 – column 3, line 31 of Huber’978; and i.e., column 3, line 27 – column 4, line 2 of Huber’996);

- A clutch (Huber’978, Fig. 1, element 18) in the driveline;
- Wherein the first sensor is operable to detect a speed of the engine (i.e., column 3, lines 12-26 of Huber’978);
- Wherein the inherently flywheel is located in the first driveline portion and the first sensor (40) is operable to detect a first parameter which is related to a rotational position of the flywheel;
- An output shaft (Huber’978, Fig. 1, element 24) of the gearbox being in the second driveline portion;
- Wherein the inherent vehicle speed sensor is operable to detect a second parameter which is related to the rotational position of the output shaft of the gearbox;
- Wherein the control unit is operable to initiate control of an output torque of the engine for substantially equalizing the prevailing speed and the reference speed between the first and second driveline portions before the gear is disengaged at the gearbox (i.e., column 2, line 56 – column 3, line 31 of Huber’978; and i.e., column 3, line 27 – column 4, line 2 of Huber’996);

- A gearchange mechanism (Fig. 1, being the combination of elements 36, 38 and 28 of Huber'978) in the gearbox;
- Wherein the control unit is operable to activate the gearchange mechanism for disengaging the gear when the prevailing speed and the reference speed between the first and second driveline portions have been substantially equalized (i.e., column 2, line 56 – column 3, line 31 of Huber'978; and i.e., column 3, line 27 – column 4, line 2 of Huber'996);
- A first component (Huber'978, Fig. 1, element 16) of the first driveline portion;
- Wherein the first sensor (40) is operable to detect a position of the first component (i.e., column 3, lines 12-26 of Huber'978);
- A second component (Huber'978, Fig. 1, element 20) of the second driveline portion; and
- Wherein the second sensor (42) is operable to detect a position of the second component (i.e., column 3, lines 12-26 of Huber'978).

Note:

It should be noted that the limitation, "*the specific element being adapted to allow elastic rotation between the first and the second driveline portions when driving torque is being transmitted in the driveline*", as recited between lines 6-7 of claim 1, is part of the preamble and has not been given patentable weight. A preamble is generally not accorded any patentable weight where it merely recites the purpose of a process or the intended use of a structure, and where the body of the

claim does not depend on the preamble for completeness but, instead, the process steps or structural limitations are able to stand alone. See *In re Hirao*, 535 F.2d 67, 190 USPQ 15 (CCPA 1976) and *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951).

Huber'978 does not <u>explicitly state</u>:

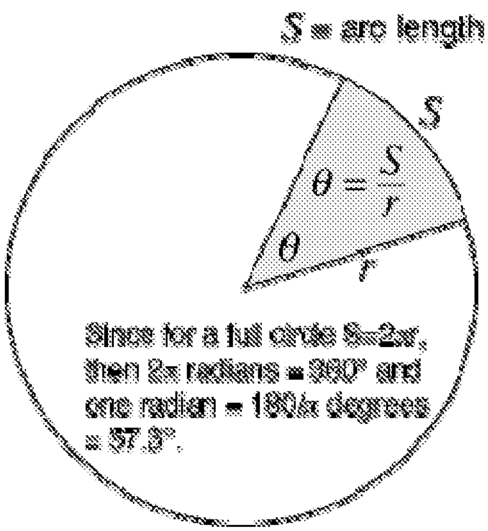
- Wherein the first sensor operable to detect <u>*an angular position*</u> of the first portion of the drive line;
- Wherein the second sensor operable to detect <u>*an angular position*</u> of the second portion of the drive line;
- Wherein the control unit is operable to store at least one measured value which is related to <u>*a reference angle*</u> between <u>*the position*</u> of the first driveline portion and <u>*the position*</u> of the second driveline portion when the gear is engaged in the gearbox, and is operable to initiate a control action so that <u>*the reference angle*</u> and <u>*the prevailing angle*</u> between the first portion and the second portion are substantially equalized before the gear is disengaged;
- Wherein the control unit is operable to initiate control of an output torque of the engine for substantially equalizing the <u>*prevailing angle*</u> and the <u>*reference angle*</u> between the first and second driveline portions before the gear is disengaged; and
- Wherein the control unit is operable to activate the gearchange mechanism for disengaging the gear when <u>*the prevailing angle*</u> and <u>*the reference angle*</u> between the first and second driveline portions have bee substantially.

BRQ'1999, on the other hand, teaches the relationship between the angular position, the time, the angular velocity and the angular acceleration, as follows:

Basic Rotational Quantities

The angular displacement is defined by:

$$\theta = \frac{S}{r}$$



For a circular path it follows that the angular velocity is

$$\omega = \frac{v}{r}$$

and the angular acceleration is

$$\alpha = \frac{a_t}{r}$$

where the acceleration here is the tangential acceleration.

In addition to any tangential acceleration, there is always the centripetal acceleration:

$$a_c = \frac{v^2}{r}$$

The standard angle of a directed quantity is taken to be counterclockwise from the positive x axis.

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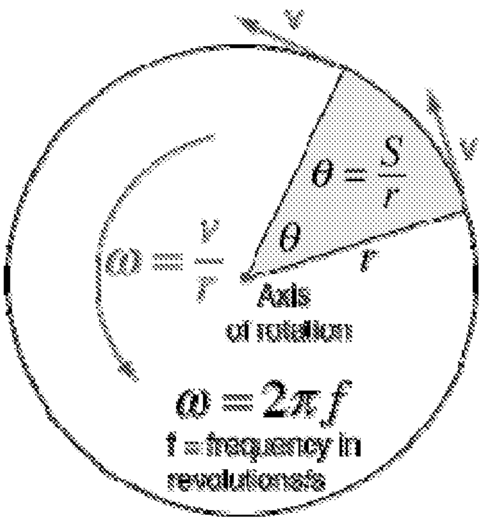
Centripetal acceleration

Angular Velocity



For an object rotating about an axis, every point on the object has the same angular velocity. The tangential velocity of any point is proportional to its distance from the axis of rotation. Angular velocity has the units rad/s.

$$v = \omega r \quad or \quad \omega = \frac{v}{r}$$

Angular velocity is the rate of change of angular displacement and can be described by the relationship

$$\omega_{average} = \frac{\Delta\theta}{\Delta t}$$

and if v is constant, the angle can be calculated from

$$\theta = \theta_0 + \omega t$$

Angular velocity can be considered to be a vector quantity, with direction along the axis of rotation in the right-hand rule sense.

Vector angular velocity

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Basic rotational quantities

Description of Rotation

Rotation is described in terms of angular displacement , time , angular velocity, and angular acceleration . Angular velocity is the rate of change of angular displacement and angular acceleration is the rate of change of angular velocity. The averages of velocity and acceleration are defined by the relationships:

Average angular velocity: $\bar{\omega} = \frac{\Delta\theta}{\Delta t}$

Average angular acceleration: $\bar{\alpha} = \frac{\Delta\omega}{\Delta t}$

where the Greek letter delta indicates the change in the quantity following it.

1. $\theta = \bar{\omega}t \qquad \bar{\omega} = \frac{\omega_0 + \omega}{2}$
2. $\omega = \omega_0 + \alpha t$
3. $\theta = \omega_0 t + \frac{1}{2}\alpha t^2$
4. $\omega^2 = \omega_0^2 + 2\alpha\theta$

Equations for constant angular acceleration.

A bar above any quantity indicates the average value of that quantity. If α is constant, equations 1,2, and 3 represent a complete description of the rotation. Equation 4 is obtained by a combination of the others.

You might want to try a numerical exploration of these equations and see them stated in words.

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Based on the teaching of BRQ'1999 above, it would have been obvious and well recognized as part of the ordinary capabilities of one skilled in the art that the first and second sensors (40 and 42) of Huber'978 must have detected the angular position of the first portion of the driveline and the second portion of the driveline, respectively, and further derived the angular velocity of the first portion of the driveline and the second portion of the driveline, respectively, in view of BRQ'1999 teaching, in order to effectively control the engaging and disengaging of the gear.

5. For the purpose of giving patentable weight to <u>the claimed specific element</u>, as recited in the preamble of the present claim 1, claims 1, 2 and 5-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent No. 6,151,978 to Huber (Huber'978) in view of applicant admission of prior art, page 4, lines 2-3 of the original specification, and the 1999 Publication of Basic Rotational Quantities (BRQ'1999).

<u>Note:</u>

It should be noticed that ***Huber'978***, column 3, lines 27-31, states, "This invention preferably includes the method that is disclosed in the copending U.S. patent application Ser. No. 08/988,465, which was filed on Dec. 10, 1997. The teachings of that application are incorporated into this specification by reference." The U.S. patent application Ser. No. 08/988,465, filed on Dec. 10, 1997, is now the U. S. Patent No. 6,167,996 to Huber et al. (Huber'996).

Claims 1, 2 and 5-20:

Huber'978 (Fig. 1; column 1, line 67 – column 6, line 4) discloses a driveline comprising:

- A first driveline portion (Huber'978, Fig. 1, being the combination of elements 12, 16 and a first portion of 18);
- A second driveline portion (Huber'978, Fig. 1, being the combination of elements a second portion of element 18, 20, 14 and 24);
- A first sensor (Huber'978, Fig. 1, element 40) operable to detect the speed information of the first portion of the driveline;
- A second sensor (Huber'978, Fig. 1, element 42 or the inherent vehicle speed sensor) operable to detect the speed information of the second portion of the driveline;
- Wherein the second speed sensor (being the inherent vehicle speed sensor) is operable to detect a speed of the vehicle;
- An engine (Huber'978, Fig. 1, element 12) inherently having a flywheel;
- A gearbox (Huber'978, Fig. 1, element 14);
- A control unit (Huber'978, Fig. 1, being combination of elements 32 and 34) operable to store at least one measured value which is related to the speed information between the first driveline portion and the second driveline portion when the gear is engaged in the gearbox, and is operable to initiate a control action so that the reference/preselected speed and a prevailing speed between the

first portion and the second portion are substantially equalized before the gear is disengaged (i.e., column 2, line 56 – column 3, line 31 of Huber'978; and i.e., column 3, line 27 – column 4, line 2 of Huber'996);

- A clutch (Huber'978, Fig. 1, element 18) in the driveline;
- Wherein the first sensor is operable to detect a speed of the engine (i.e., column 3, lines 12-26 of Huber'978);
- Wherein the inherently flywheel is located in the first driveline portion and the first sensor (40) is operable to detect a first parameter which is related to a rotational position of the flywheel;
- An output shaft (Huber'978, Fig. 1, element 24) of the gearbox being in the second driveline portion;
- Wherein the inherent vehicle speed sensor is operable to detect a second parameter which is related to the rotational position of the output shaft of the gearbox;
- Wherein the control unit is operable to initiate control of an output torque of the engine for substantially equalizing the prevailing speed and the reference speed between the first and second driveline portions before the gear is disengaged at the gearbox (i.e., column 2, line 56 – column 3, line 31 of Huber'978; and i.e., column 3, line 27 – column 4, line 2 of Huber'996);
- A gearchange mechanism (Fig. 1, being the combination of elements 36, 38 and 28 of Huber'978) in the gearbox;

- Wherein the control unit is operable to activate the gearchange mechanism for disengaging the gear when the prevailing speed and the reference speed between the first and second driveline portions have been substantially equalized (i.e., column 2, line 56 – column 3, line 31 of Huber'978; and i.e., column 3, line 27 – column 4, line 2 of Huber'996);
- A first component (Huber'978, Fig. 1, element 16) of the first driveline portion;
- Wherein the first sensor (40) is operable to detect a position of the first component (i.e., column 3, lines 12-26 of Huber'978);
- A second component (Huber'978, Fig. 1, element 20) of the second driveline portion; and
- Wherein the second sensor (42) is operable to detect a position of the second component (i.e., column 3, lines 12-26 of Huber'978).

Huber'978 lacks:

- Wherein the specific element is adapted to allow elastic rotation between the first and the second driveline portions when driving torque is being transmitted in the driveline.

Huber'978 does not <u>explicitly state</u>:

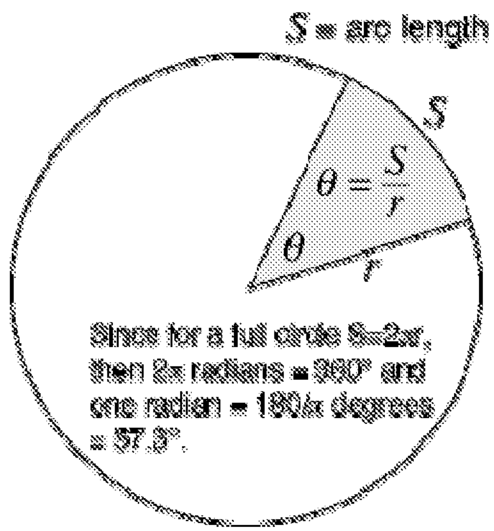
- Wherein the first sensor operable to detect <u>*an angular position*</u> of the first portion of the drive line;

- Wherein the second sensor operable to detect *an angular position* of the second portion of the drive line;
- Wherein the control unit is operable to store at least one measured value which is related to *a reference angle* between *the position* of the first driveline portion and *the position* of the second driveline portion when the gear is engaged in the gearbox, and is operable to initiate a control action so that *the reference angle* and *the prevailing angle* between the first portion and the second portion are substantially equalized before the gear is disengaged;
- Wherein the control unit is operable to initiate control of an output torque of the engine for substantially equalizing the *prevailing angle* and the *reference angle* between the first and second driveline portions before the gear is disengaged; and
- Wherein the control unit is operable to activate the gearchange mechanism for disengaging the gear when *the prevailing angle* and *the reference angle* between the first and second driveline portions have bee substantially.

Applicant admission of prior art, page 4, lines 2-3 of the original specification, on the other hand, teaches the conventional clutches/specific elements, such as clutch 18 of Huber'978, are often of a design to allow elastic rotation between the first and the second driveline portions when driving torque is being transmitted in the driveline.

BRQ'1999, however, teaches the relationship between the angular position, the time, the angular velocity and the angular acceleration, as follows:

Basic Rotational Quantities



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$$\theta = \frac{S}{r}$$

For a circular path it follows that the angular velocity is

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where the acceleration here is the tangential acceleration.

In addition to any tangential acceleration, there is always the centripetal acceleration:

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The standard angle of a directed quantity is taken to be counterclockwise from the positive x axis.

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Centripetal acceleration

HyperPhysics***** Mechanics ***** Rotation

R Nave

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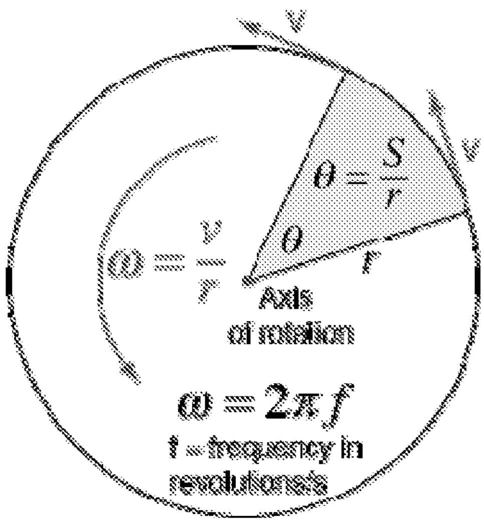
Angular Velocity



For an object rotating about an axis, every point on the object has the same angular velocity. The tangential velocity of any point is proportional to its distance from the axis of rotation. Angular velocity has the units rad/s.

$$v = \omega r \quad or \quad \omega = \frac{v}{r}$$

Angular velocity is the rate of change of angular displacement and can be described by the relationship

$$\omega_{average} = \frac{\Delta\theta}{\Delta t}$$

and if v is constant, the angle can be calculated from

$$\theta = \theta_0 + \omega t$$

Angular velocity can be considered to be a vector quantity, with direction along the axis of rotation in the right-hand rule sense.

Vector angular velocity

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Average angular velocity: $\bar{\omega} = \frac{\Delta\theta}{\Delta t}$

Average angular acceleration: $\bar{\alpha} = \frac{\Delta\omega}{\Delta t}$

where the Greek letter delta indicates the change in the quantity following it.

1. $\theta = \bar{\omega}t$ $\quad \bar{\omega} = \frac{\omega_0 + \omega}{2}$
2. $\omega = \omega_0 + \alpha t$
3. $\theta = \omega_0 t + \frac{1}{2}\alpha t^2$
4. $\omega^2 = \omega_0^2 + 2\alpha\theta$

Equations for constant angular acceleration

A bar above any quantity indicates the average value of that quantity. If α is constant, equations 1,2, and 3 represent a complete description of the rotation. Equation 4 is obtained by a combination of the others.

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HyperPhysics***** Mechanics ***** Rotation *R Nave*

Based on the teaching of BRQ'1999 above, it would have been obvious and well recognized as part of the ordinary capabilities of one skilled in the art that the first and

second sensors (40 and 42) of Huber'978 must have detected the angular position of the first portion of the driveline and the second portion of the driveline, respectively, and further derived the angular velocity of the first portion of the driveline and the second portion of the driveline, respectively, in view of BRQ'1999 teaching, in order to effectively control the engaging and disengaging of the gear.

Since all claimed elements were known in the prior art, as set forth above, one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions, and the combination would have yield predictable results to one of ordinary skill in the art at the time of the invention.

6. Claims 3-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent No. 6,151,978 to Huber (Huber'978) in view of applicant admission of prior art, page 4, lines 2-3 of the original specification, and the 1999 Publication of Basic Rotational Quantities (BRQ'1999), as applied to claims 1, 2 and 5-20 above, and further in view of U. S. Patent No. 4,601,676 to Tojima et al.

Claims 3-4:

Huber'978 in view of applicant admission of prior art and BRQ'1999 disclose the limitations as set forth in paragraph 6 above. Regarding claims 3-4, Huber'978 does not explicitly disclose:

- Wherein the clutch includes a clutch disc, a hub connected to one of the first and second driveline portions; and

- Wherein the clutch disc is operable to allow elastic rotation of at least ± 8 degrees;

Tojima (i.e., Figs. 1-6; column 1, line 64 – column 4, line 2), on the other hand, teaches a clutch disc comprising:

a. A flywheel (i.e., column 2, line 66);

b. A clutch hub (i.e., Fig. 1, element 1);

c. A clutch peripheral portion round the clutch hub (i.e., Fig. 1);

d. Wherein the clutch disc is operable to allow elastic rotation between the hub and the peripheral portion (i.e., column 2, line 64 – column 3, line 27); and

e. Wherein the clutch allows elastic rotation at least ± 8 degrees (i.e., Fig. 5; column 3, lines 25-26).

It would have been obvious to one of ordinary skill in the art at the time this invention was made to modify Huber'978 such that clutch 18 is the damper disc type clutch, in view of Tojima, in order to effectively absorb torque vibrations in the vehicle driveline (i.e., Tojima, column 3, line 61 – column 4, line 2).

Response to Arguments

7. Applicant's arguments filed on 28 March 2008 have been fully considered but they are not persuasive.

First, Applicant argues that Huber'978 in view of BRQ does not disclose a sensor for detecting an actual position of the shaft, as recited in claims 1 and 11. Examiner

respectfully disagrees because, as explained in paragraph 5 above, based on the teaching of BRQ'1999, it is well recognized as part of the ordinary capabilities of one skilled in the art that the first and second sensors (40 and 42) of Huber'978 must have detected the angular position of the first portion of the driveline and the second portion of the driveline, respectively, and further derived the angular velocity/rotational speed of the first portion of the driveline and the second portion of the driveline, respectively, in order to effectively control the engaging and disengaging of the gear.

Second, Applicant argues that Huber'978 reference teaches away from modifying the speed sensor of Huber'978 to detect the actual position of the shaft. Examiner respectfully disagrees because, as set forth above, Huber'978 sensors must have, first, detected the angular position of the first portion of the driveline and the second portion of the driveline, before, further derived the angular velocity/rotational speed of the first portion of the driveline and the second portion of the driveline, respectively.

Third, it should be noted that the present claims 1 and 11 do not require how, specifically, the first and second sensors detect the positions of the first and second portions of the driveline.

Accordingly, as set forth above, the applied references meet the claimed limitations.

Conclusion

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to David D. Le whose telephone number is 571-272-7092. The examiner can normally be reached on Mon-Fri (0900-1730).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Charles A. Marmor can be reached on 571-272-7095. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/David D. Le/
Primary Examiner, Art Unit 3681
06/18/2008

ddl